Your Groupmates' Success Can Increase, Not Diminish, Your Success

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ABSTRACT
This article seeks to explain why, even in norm referenced assessment environments, students and other stakeholders should not be concerned that students who help peers learn are negatively impacting their own assessments. The article opens with a review of assessment options: norm referenced, criterion referenced and ipsative. Next, Social Interdependence Theory is explained for the insights it might offer as to how students view their peers' success. The article's third section summarises some of the research on peer learning, in particular research on what forms of peer interaction might best promote learning. Finally, the article examines three contexts in which norm referencing is applied - standardised exams, class grades and class ranking – and concludes that the chances are small of groupmates' success diminishing the success of students who have helped their groupmates. This conclusion is reached based, first, on mathematical calculations and, most importantly, on the research based premise that when students provide elaborated help to groupmates, the helpers are likely to boost their own scores.

Introduction

Group activities feature regularly in many classrooms. Furthermore, students may also study together outside of class, both in person, i.e., face-to-face interaction, and electronically, e.g., via text messaging. However, some students, sometimes influenced by parents, other adult family members and societal influences, are reluctant to work with peers (Chaviaris & Kafoussi 2010). Reasons for this reluctance include: (1) lack of times and places conducive to peer collaboration, (2) negative experience with peers who only wish to receive help but seldom reciprocate, (3) negative experience with peers who attempt to dominate groups, and (4) students' lack of skill in providing and receiving academic assistance.

The inspiration for the current paper arose from yet another reason students might not want to assist peers: the fear that by improving the outcomes of their fellow students, students are jeopardizing their own chances of successful outcomes, such as their scores on standardised exams, their grades in courses and their class rankings. This fear of diminished success was the explanation given to one of the authors of the present paper during an informal conversation with a tertiary student who stated that as far back as primary school, it had not been her habit or the habit of her peers to provide each other with academic assistance. This paper was conceived to answer this student and the other students and stakeholders with similar views.

The fear that helping peers constitutes a zero sum game stems in part from the practice of using norm referenced assessment to assign grades, ranks, etc. to student performances. Norm referenced assessment compares students' performances with the performances of other students. Norm referenced assessment contrasts with criterion

referenced assessment which compares students' performances against a fixed standard of quality.

This article makes two main arguments. First, the authors claim that by helping peers, students can increase their own learning and academic achievement. Thus, while the helped students' scores may increase, so too may the scores of the students who provided the help. The second argument looks at what happens if norm referenced assessment is utilized and the helped students improve their scores but, surprisingly, the helping students do not improve their own scores. Even in such circumstances, a more in-depth understanding of norm referenced assessment reveals that the helping students' outcomes are unlikely to suffer.

The article begins with a review of assessment options, followed by an exploration of Social Interdependence Theory with reference to helping behaviours. Next, to support the article's first main argument - that students boost their own learning by attempting to teach peers - the benefits of cooperation among students are discussed, along with the types of cooperation most likely to promote those benefits. Then, to support the article's second main argument - that improvement in peers' outcomes is unlikely to damage the outcomes of peer helpers - examples are presented based on norm referencing applied to standardise test scores, grades and ranks.

Literature Review

This literature review has three sections. This first section discusses three of the options for assessment, focusing of norm referenced and criterion referenced assessment. The literature review's second section discusses Social Interdependence Theory, a theory that provides an understanding of what might motivate students to assist or not assist the learning of peers. The third section moves from the theoretical to the practical, reviewing some of the literature on the benefits students can enjoy by learning collaboratively.

Norm Referenced and Criterion Referenced Assessment

Three main options exist for assessing the performance of students on measures of skills and knowledge: (1) comparing student performances with those of other students, (2) comparing student performances to predetermined standards and (3) comparing each student's performance to their own past performance. These three assessment methods are known as norm referenced, criterion referenced and ipsative, respectively, with norm referenced and criterion referenced, in the authors' experience, being the most common, with various combinations of these two options also being employed. This article focuses on the impact of norm referenced assessment on students' attitudes towards peer collaboration.

In norm referenced assessment, students' performances are compared to those of a "normative" group. This group can consist of those doing the assessment at the same time as the students or at different times. Norm-referenced assessments allow assessors to give the distribution of students' scores the shape they like. The desired distribution is often bell-shaped, with a majority of students near the middle, and the number of students decreasing near the ends of the distribution. For instance, in a grading system from A to F, the smallest numbers of students receive As and Fs, e.g., 15% each, with the next largest numbers of students receiving Bs and Ds, e.g., 20% each, and the largest number, those at the middle of the curve, receiving Cs, e.g., 30%.

In norm referenced assessment, student performance can be compared within the same cohort or between cohorts. When the reference group is the same as the group of students actually assessed, the proportion of students receiving each of the five grades is fixed, regardless of the performance of any cohort of students in terms of the actual quality of the students' work, the amount of their effort, or of any comparison to these students'

previous performances (Center for Teaching and Learning, 2015). On the other hand, when the students assessed are compared with a previous cohort, as in the Scholastic Aptitude Test (CollegeBoard, 2015) exam, the distribution of the current cohort's grades is not known in advance. Only the proportion of grades of the students that composed the reference cohort is predetermined. However, that reference cohort is usually chosen because of its supposed resemblance (or partial resemblance) to the assessed group of students. Therefore, it is expected that the grade distribution of the assessed students will also resemble the predetermined distribution. The advantage of using an external reference cohort lies in the possibility of comparing several groups to this cohort and therefore with each other.

Social Interdependence Theory

Insights into the reactions of students and others to norm referenced assessment may be gained from Social Interdependence Theory (Deutsch, 1949, 1962; Johnson & Johnson, 2006; Lewin, 1935). This theory seeks to understand how people view their connections with others. When applied to formal education, the theory provides ideas that educators can use to understand and positively impact interactions among students, so as to encourage students to learn from and with each other and to make education a satisfying experience for all. Social Interdependence Theory is often cited as a foundation for cooperative learning (also known as collaborative learning), a system of principles and techniques for encouraging successful peer interaction among students.

Social Interdependence Theory discusses three lens through which people, including students, can view others: positive interdependence, negative interdependence or no interdependence. A feeling of positive interdependence exists when people believe their outcomes are positively correlated with those of others, i.e., what benefits one benefits the other(s), and what harms one harms the other(s). Negative interdependence refers to the situation when people feel that their outcomes are negatively correlated, i.e., what benefits one harms the other(s), and what harms one benefits the other(s). No interdependence describes the situation when people perceive little or no correlation between their outcomes, i.e., they believe that they neither benefit nor are they harmed by what happens to others. Please note the repeated use of the subjective term *feel* which is used to highlight that people's perceptions do not necessarily mirror the reality of others' impact on their outcomes.

The three forms of interdependence can be illustrated in a simplistic manner by a sports example. If two people are doubles partners in badminton, they may feel positively interdependent, i.e., they believe that their outcomes are positively correlated. For example, if one helps the other improve their backhand, both are more likely to achieve the joint goal of winning the next match they play as a team, i.e., the outcomes of both could be seen as likely to improve. Similarly, if one member suffers an ankle injury, they both have less chance of winning, i.e., the outcomes of both could be seen as likely to worsen.

Negative interdependence can be seen when the pair play singles, with each on the other side of the net. Now, their outcomes might be perceived as negatively correlated. For instance, when one person's backhand improves, that person's chances of winning increase, while the person who is now their opponent sees their own chances of winning decrease. Similarly, an ankle injury still could be seen as harming the prospects of the person who suffers the injury, but now the ankle injury might be taken as improving the prospects of the person on the other side of the net.

To picture a situation in which no interdependence might be perceived, imagine that one of the two badminton players leaves the badminton court to go swimming, while the other continues playing badminton. The success of the one person in swimming might not be seen as impacting whether the other person wins at badminton. In such a situation, the two people may feel that no correlation exists between their outcomes.

The above examples are simplistic, because within the same situation, more than one form of interdependence can exist in people's minds. For instance, when playing singles in badminton, if one person is injured, while the other person's chances of winning improve, a game with an injured opponent may be less enjoyable and provide less exercise and less challenge. Thus, while at first glance, the situation may appear to be a clear cut one of negative interdependence (their outcomes are negatively correlated, as one person's chances of winning increase, while the other's chances of winning decrease), positive interdependence may also be present in the minds of the players who both may want to enjoy a game with a closely matched player.

Many student behaviors might be taken to indicate that they feel negatively interdependent with groupmates and other classmates. For instance, in the case of students asking questions to teachers, either face-to-face or electronically, do students wait until after class when no other students are able to know the teachers' response? Perhaps, these students do not want to risk embarrassment by asking what might be perceived as "dumb" questions, or, indicative of feelings of negative interdependence, perhaps these students want to be in sole possession of the teachers' answers. Another example of a behavior that might indicate that students, consciously or unconsciously, feel negatively interdependent with peers is students giving answers to their partners but not explaining to their partners how to find the answers on their own and not checking to see if their partners understand the given answers. This answers-only assistance is similar to "giving someone a bowl of rice but not helping them learn how to grow their own rice."

Returning to the topic of assessment, norm referenced assessment may foster a competitive environment among students, because students may be likely to view themselves as negatively interdependent with those involved in the same assessment (Johnson & Johnson, 2003). A feeling of negative interdependence discourages helping behaviors among students, as students may feel that when norm referenced assessment is used, by boosting their peers' scores, they are hurting their own outcomes. Such an attitude potentially decreases the learning of all.

To promote cooperation for learning among students, Johnson and Johnson (2003) advocate the use of criterion referenced assessment, because such assessment reduces the potential for feelings of negative interdependence among students, i.e., it may reduce feelings of hostile competition among students (Eggen & Kauchak, 2007). Furthermore, Eggen and Kauchak also maintained that because criterion referenced assessment compares students with standards, not with other students, such assessment provides stakeholders with a more accurate view of the current state of students' knowledge and skills. This article seeks to present evidence that even when norm referenced assessment cannot be avoided, students nonetheless gain from collaborating with peers. To build this argument, the next section of the paper reviews benefits of student-student collaboration.

Benefits of Cooperation among Students

In addition to Social Interdependence Theory, many other theories in the education literature can be referenced in support of the use of student-student interaction as a significant mode of learning. These include Sociocultural Theory (Vygotsky, 1978), Humanist Psychology (Maslow, 1968), Social Constructivism (Palincsar, 1998) and Multiple Intelligences Theory (Gardner, 1993). Additionally, a great many studies have been conducted on the efficacy of methods of promoting student-student interaction. This research has involved a wide range of learners, subjects and modes of learning, including online learning. In general, the research suggests the collaboration among students is associated with positive effects on both cognitive and affective variables (Ibáñez, García Rueda, Maroto, & Kloos, 2013; Johnson, Johnson, & Stanne, 2000; Kyndt, Raes, Lismont, Timmers, Dochy, &

Cascallar, 2013; Slavin, 1991b). To aid in the implementation of student-student interaction, the education literature is replete with guidance for teachers (e.g., Baloche, 1998; Cohen, 1994; Gillies, 2007; Johnson, Johnson, & Holubec, 2008; Sharan, 1999; Slavin, 1995).

Two elements may be particularly important to successful interaction among students. First, when students feel concern for each other, they may be more likely to strive for effective interaction. This concern links with positive interdependence, discussed in the section on Social Interdependence Theory. A second element crucial to successful student-student interaction involves how students interact. Do they only give each other answers, or do they discuss, explain, give examples, debate and otherwise engage in elaborated interactions? Many studies by Webb and her colleagues, e.g., Webb (1991) and Webb, et al. (2009), as well as by other researchers, such as Gillies (2007) and Kuhn and Crowell (2011), have suggested the importance of quality interactions.

Unfortunately, many students, including the one cited in the second paragraph of this article, and other stakeholders in education, believe that the benefits of student-student interaction flow mostly in one direction: from the students who help their peers to the peers who receive the help, with no benefits accruing to those who assist their peers. For instance, Allen (1991) and Matthews (1992) raised the concern that when students engage in peer interaction, the high achievers are forced to tutor their lower achieving peers and to serve these peers as role models. The higher achievers waste time they could have otherwise spent on enrichment. In other words, they only give; they do not receive.

Johnson and Johnson (1993) and Slavin (1991a), two long-time researchers in the field of cooperative learning, responded to the claims of Allen and Matthews by highlighting two points. First, following on the research cited above by Webb (1991) and others, the way that students interact plays an important role in determining whether students of all achievement levels (both those who help and those who receive help) benefit. In this regard, the Johnsons and Slavin urged that student interaction be facilitated with reference to the literature on cooperative learning, including the use of thinking skills and collaborative skills. Second, the Johnsons and Slavin referred to the large body of research, cited above, suggesting that when cooperative learning was properly implemented, both high and low achievers outperformed similar students who did not study in cooperative learning environments. The research cited by the Johnsons and Slavin supports one of the two key points of this paper: when peers interact, the potential exists for all to learn, even those students of relatively higher achievement levels.

In addition to cognitive goals, the research cited by the Johnsons and Slavin suggests that cooperative learning is also associated with affective benefits, such as self-esteem and liking for school. For instance, when students feel positively interdependent with peers, i.e., they feel they are living by the "All for one and one for all" motto of the Three Musketeers (Dumas, 1844/1998), students may develop deeper ties with their peers, for example, across potential divides of race and academic achievement. Such ties may make school a place where diverse students of all achievement levels experience greater academic and social success.

To conclude this discussion of the benefits of cooperation among students, two concepts from Chinese culture deserve mention (Jacobs, 2013). These concepts, which may well resonate in other cultures, are guanxi and renqing. Guanxi involves building relationships. When students live up to their responsibilities as group members, they may develop a reputation for reliability. Based on this reputation, others may be more willing to collaborate with them both in the present and in the future, in academic and non-academic endeavours. Students who ignore opportunities for relationship building do so at their own peril, for as the proverb states, "Often, it is not what you know but who you know that determines your success". Renqing also concerns relationship building. It means to return

favours. By assisting in the learning of their peers, students build the pool of favours from which they can later collect whether in academic or non-academic realms.

<h3 align="center">Examining the Impact of Norm Referenced Assessment in Specific Contexts</h3>

This section of the paper examines the concrete impact of norm referencing on the assessments which students experience, beginning with assessments normed via other cohorts. Then, the section looks at assessments normed with the same cohort. Here, the discussion centres on assessment involving grades and assessment involving rankings.

Assessments with Scoring Based on the Scores of Past Cohorts
Some standardised exams, e.g., the Scholastic Aptitude Test (CollegeBoard, 2015), apply norm referencing by comparing students' scores not with the scores of those who took the exam at the same time, but with scores of test takers from a previous year. In this case, students' outcomes could not be impaired if students preparing for the exam provide assistance which boosts the scores of peers taking the same exam at the same time, as norming is not done within their cohort. Furthermore, it bears noting that even when standardised exams are normed on the same cohort, the outcome of one or two peers is very unlikely to affect a student's final score, as cohorts consist of many thousands of students.

Assessments with Scoring Based on the Scores of the Same Cohort - The General Case
With norm referenced assessment that uses the same students as the reference group, e.g., all the students in the same class, for a given number of students, it is only when the performance of the helped students surpasses the performance of the helpers that the helpers' final outcomes could be negatively impacted. This low incidence of negative impact pertains whether those assessments are expressed as grades, such as A or C, or as rank, such as students in a class of 40 being ranked #5 or # 35. Next, the two cases, i.e., grades and percentile rank, will be illustrated as to the potential impact of helped students' outcomes on the outcomes of students who help them.

The Case of Grades. This subsection considers whether, under a norm referenced regime, there might be any negative impact on the grades of students who successfully teach their peers. When norm referenced assessment is applied to grades, e.g., A, B, C, D and F, the number of students who will receive each grade is fixed, e.g., with 60 students, if 15% are to receive As, nine students will receive As, and if 30% are to receive Cs, 18 students will receive Cs. (Please note that, as stated earlier, the authors do appreciate that not all institutions and not all teachers apply a pure version of norm referencing.)

An example of the potential impact of the improvement of helped students on the outcomes of helper students would be the case of Student 1 with a past average of 75 helping Student 2 with a past average of 50. On the next assessment, Student 1 again scores 75, while thanks in part to Student 1's help, Student 2 scores 72. In this case, student 2's improvement has no impact on the grade of Student 1, because 2's score is not above 1's score.

Student 2's improvement only has the potential to lower Student 1's grade if 2 scores above 1. However, even if 2's score is higher than 1's, Student 1 would only drop down a grade under special circumstances. An example of such circumstances would be if Student 1's score of 75 would have been high enough to be 9th highest among the class of 60 students - please remember that in this scenario only 15% of the class, i.e., nine students, can achieve an A. If Student 2's score is 85, thus exceeding 1's score, Student 1's 75 now becomes 10th highest in the class, dropping Student 1 out of the list of nine students to receive a grade of A.

To generalise from the above example, with norm referencing applied to an A-F grading system, even if helped students surpass the scores of their helpers, the probability of the helping students experiencing a grade drop is slight. This situation obtains due to the fact that it is only when helpers' scores lie on the lower edge of a grade range that those whom they help can inadvertently bump them down a grade. To return to our example of Students 1 and 2, if the norm referencing system being applied in a class of 60 students assigns an A grade to 15% of the class, i.e., nine students, it is only when Student 1's score is 9th highest that Student 2 surpassing Student 1's score could bump Student 1 down to a B.

Thus, in a class of 150 students, the probability of a helped students higher score pushing down the grade of their helper is 4/150 = 3%. In a small class of 20 students, helpers have a probability of 4/20=20% to see their grade drop in the event that their helped students surpass them. These percentages are calculated by dividing the number of students on the edge of falling a grade (4 students, i.e., falling from A to B, from B to C, from C to D and from D to F), by the total number of students in the class.

The Case of Ranking. Norm referencing measures students in comparison with other students. The previous subsection of this paper examined the case of grades being used to compare students. This subsection examines the case of rank being used to compare students. For instance, in some schools, the students in each class are ranked, e.g., in a class of 40, one student will be #1 in the class (the highest achieving student), another will be #23, yet another will be #40, etc. Heffernan (2014) recounted the story of a secondary school student who was ranked in the top five in her class. The student recalled that, "The top five are particularly conscious of each other… I asked one of them to help me—and he wouldn't!... He said his mother had told him not to because it might jeopardize his ranking" (p. 36).

When ranking is used, formerly low achieving students who show significant improvement, perhaps due to the help of higher achieving peers, can move their helpers down a rank. For instance, if Student 1 who was ranked #3 in the class, continuously helped Student 2 who was ranked #8 in the class, over time, Student 2's achievement level might eventually have increased to the point where Student 2 rose to become #3 in the class, with Student 1 moving to #4. However, please note that Student 1 fell only one place, i.e., from #3 to #4, not one grade, e.g., from an A to a B.

When Helping Students Improve. The two previous subsections of this paper have considered scenarios in which the performance of helped students improves while no change takes place in the performance of those students who help their peers. However, as noted in the literature review earlier in this article, e.g., in the finding of the research of Webb and her colleagues (2009), when students provide elaborated help to peers, both the receivers and recipients of such help benefit. Theories of learning, such as Social Constructivism, support this view. Furthermore, Social Interdependence Theory provides ideas for how teachers can promote positive interdependence and, thereby, a learning climate in which students want to foster each other's success. Thus, both in the case of grades and in the case of ranking, students are very unlikely to suffer from helping peers, because the helped peers are unlikely to overtake those who help them, as the more likely scenario may be that the helpers' scores rise in tandem with the scores of those whom they help.

Conclusion

In conclusion, the purpose of this paper has been to encourage students to learn together with peers, even in the presence of norm referenced assessment systems. Specifically, the paper sought to allay students' fears that helping peers is a one-way street

with the helped students enjoying all the benefits and the helping students not only not benefiting but potentially losing out, as those students they help lower the helpers' grades and ranking. To ease this concern, two main points were made. One, from the perspective of theory and research on what promotes learning, when students help others by providing in depth explanations, the helpers learn, too. Furthermore, when a spirit of positive interdependence blooms among students, the environment for learning brightens considerably. Two, from a mathematical perspective, in the case of grades and class rank, even when outcomes of helped students improve, that improvement is unlikely to impair the outcomes of the helping students.

      To return to the conversation that inspired this paper, the conversation one of the authors had with a student who did not want to study with others for fear that learning is a zero sum game, unfortunately, the author has lost contact with that student. However, the authors urge those reading this article to engage students and other education stakeholders in frank and open discussions about why they do or do not favour peer collaboration for learning. Certainly, in the process of preparing this article, the authors have deepened their own understanding of the topic and will continue to promote cooperative learning and to encourage people to look for and act on the positive interdependence in their lives in education and elsewhere.

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